

We claim:

1. A dental x-ray diagnostic apparatus for performing real-time digital radiography of a patient skull, comprising:
 - a base frame to for supporting the apparatus;
 - a sliding frame which is capable of sliding vertically along the base frame which is operated by an independent actuator under microcomputer control;
 - a rotary frame coupled to the sliding frame by a cinematic unit, and supporting an x-ray source at one end, and an x-ray imager at the other end;
 - said cinematic unit, allowing execution of orbital movements of said x-ray source and said x-ray imager around the patient skull, characterized in that the orbital movement is composed of one rotation movement and two linear movements in a plane, driven by independent actuators controlled by data momentarily supplied from a microcomputer.
2. The apparatus as set forth in claim 1 wherein the x-ray imager has a linear shaped active area of a size approximately corresponding to the x-ray field size at the film plane.
3. An apparatus as in claim 1, further comprising a second x-ray imager.
4. The apparatus as set forth in claim 3, wherein said second x-ray imager has an active area of a size approximately corresponding to the minimum useful x-ray

field size at the film plane.

5. The apparatus as set forth in claim 3 wherein said second x-ray imager is associated with a horizontal scanning movement, and has a linearly shaped active area of a length approximately corresponding to the minimum useful height of the x-ray field size at the film plane.
6. The apparatus as set forth in claim 3 wherein said second x-ray imager is associated with a horizontal scanning movement, and is provided with an independent active actuator capable of performing the linear translation of said second x-ray imager during the scanning movement under computer control.
7. The apparatus as set forth in claim 3, wherein said second x-ray imager is associated with a vertical scanning movement, and has a linearly shaped active area of a length approximately corresponding to the minimum useful width of the x-ray field size at the film plane.
8. The apparatus as set forth in claim 3, wherein said second x-ray imager is associated with a rotational scanning movement, and has a linearly shaped active area of a length approximately corresponding to the half the minimum useful height of the x-ray field at the film plane.

9. The apparatus as set forth in claim 3, wherein said second x-ray imager is associated with a vertical, or horizontal, or rotational scanning movement, and the x-ray beam is collimated by a collimator intercepting the x-ray beam before the patient and in proximity of the patient, which is provided with an independent active actuator capable of performing the linear or rotational translation of the same secondary collimator during a scanning movement under computer control.
10. The apparatus as set forth in claim 1, **comprising** a primary collimator operated by independent active actuators under microcomputer control, allowing resizing of the x-ray field to any desired format required for the chosen radiographic modality as well as the translation of the same x-ray field during a vertical or horizontal or rotational scanning process.
11. The apparatus as set forth in claim 3 wherein a mechanism is given providing relocation of said second x-ray imager selectively between the Cephalographic and the Panoramic position.
12. The apparatus as set forth in claim 11 wherein such mechanism comprises a telescopic arm providing relocation either manually or automatically by an independent actuator under microcomputer control upon user command.

13. The apparatus as set forth in claim 11 wherein such mechanism comprises a folding arm providing relocation either manually or automatically by an independent actuator under microcomputer control upon user command.
14. The apparatus as set forth in claim 11 wherein such mechanism comprises a detachable connector allowing in a secure and ergonomic way the manual connection and disconnection of the x-ray imager selectively between the Cephalographic and the Panoramic position.
15. The apparatus as set forth in claim 1 wherein the patient positioning system used in Cephalography is provided with independent active actuators by which it can be translated relative to its support frame in order to maintain a firm patient position during a horizontal or vertical scanning process where the movement of the same support frame is involved.
16. A method for operating a dental x-ray diagnostic apparatus performing real-time digital radiography, comprising the steps of:
- positioning the patient by the relevant patient positioning system;
 - irradiating the patient skull during the orbital movement of x-ray source and x-ray imager; and,
 - performing acquisition of the image data by the x-ray imager and digital processing of the same data for the reconstruction of the diagnostic image.

17. A method for operating a dental x-ray diagnostic apparatus performing real-time digital radiography in Cephalography, comprising the steps of:

aligning the x-ray source with the x-ray imager, either manually or automatically;

positioning the patient by the relevant patient positioning system;

irradiating the patient skull; and,

18. A method for operating a dental x-ray diagnostic apparatus performing real-time digital radiography in cephalography, comprising the steps of:

aligning the x-ray source with the x-ray imager, either manually or automatically;

positioning the patient by the relevant patient positioning system;

setting the collimator format for a narrow x-ray beam laying in the vertical plane;

starting a scanning process during which the x-ray beam is linearly translated through the patient skull in the horizontal (Y) direction by the coherent horizontal movement of the x-ray source and the x-ray imager under computer control; and,

performing acquisition of the image data by the x-ray imager, and computer processing for the reconstruction of the diagnostic image, inclusive of correction of the magnification distortion in the horizontal direction.

19. The method of claim **19** wherein, instead of aligning the x-ray source with the second x-ray imager for Cephalography, the first x-ray imager is relocated either manually or automatically, to the position aligned with the x-ray source required for Cephalography.

20. A method for operating a dental x-ray diagnostic apparatus performing real-time digital radiography in cephalography, comprising the steps of:

- aligning the x-ray source with the x-ray imager, either manually or automatically;
- positioning the patient by the relevant patient positioning system;
- setting the collimator format for a narrow x-ray beam laying in the vertical plane;
- starting a scanning process during which the x-ray beam is linearly translated through the patient skull in the horizontal (Y) direction by the coherent horizontal movement of the primary x-ray collimator and the x-ray imager under computer control; and,
- performing acquisition of the image data by the x-ray imager, and computer processing for the reconstruction of the diagnostic image.

21. A method for operating a dental x-ray diagnostic apparatus performing real-time digital radiography in cephalography, comprising the steps of:

aligning the x-ray source with the x-ray imager, either manually or automatically;

positioning the patient by the relevant patient positioning system;

setting the collimator format for a narrow x-ray beam laying in the horizontal plane;

starting a scanning process during which the x-ray beam is linearly translated through the patient skull in the vertical (V) direction by the coherent vertical movement of the x-ray source and the x-ray imager under computer control; and,

performing acquisition of the image data by the x-ray imager, and computer processing for the reconstruction of the diagnostic image, inclusive of correction of the magnification distortion in the horizontal direction.

22. A method for operating a dental x-ray diagnostic apparatus performing real-time digital radiography in cephalography, comprising the steps of:

aligning the x-ray source with the x-ray imager, either manually or automatically;

positioning the patient by the relevant patient positioning system;

setting the collimator format for a narrow x-ray beam laying in the horizontal plane;

starting a scanning process during which the x-ray beam is linearly translated through the patient skull in the vertical (V) direction by the coherent vertical movement of the primary x-ray collimator and the x-ray imager under computer control; and,

performing acquisition of the image data by the x-ray imager, and computer processing for the reconstruction of the diagnostic image.

23. A method for operating a dental x-ray diagnostic apparatus performing real-time digital radiography in cephalography, comprising the steps of:

aligning the x-ray source with the x-ray imager, either manually or automatically;

positioning the patient by the relevant patient positioning system;

setting the collimator format for a narrow x-ray beam. ;

starting a scanning process during which the x-ray beam is rotationally translated through the patient skull by the coherent rotational movement of the primary x-ray collimator and the x-ray imager under computer control; and,

performing acquisition of the image data by the x-ray imager, and computer processing for the reconstruction of the diagnostic image.